AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (currently amended): A colored composition comprising a carrier and a colorant in particulate form, wherein said colorant is produced by providing a dispersion of similarly charged particles in a carrier to produce an ordered periodic array of said particles, coating said array of particles with a matrix, and fixing said array of particles within said matrix, whereby said colorant ~~comprising~~comprises an ordered periodic array of said particles held in a~~said~~ matrix wherein a difference in refractive index between said matrix and said particles is at least about 0.01 and said matrix is a cross-linked polymer.

2. (original): The colored composition of claim 1, wherein the difference in refractive index between said matrix and said particles is at least about 0.1.

3. (cancelled)

4. (currently amended): The colored composition of claim ~~3~~1, wherein said polymer is selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

5. (original): The colored composition of claim 1, wherein said matrix is selected from the group consisting of a metal oxide and a semiconductor.

6. (original): The colored composition of claim 1, wherein said particles comprise a polymeric material selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-

containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

7. (original): The colored composition of claim 1, wherein said particles comprise a material selected from the group consisting of a metal oxide and a semiconductor.

8. (original): The colored composition of claim 1, wherein said array is less than about 20 μm thick.

9. (original): The colored composition of claim 1, wherein said array is less than about 10 μm thick.

10. (original): The colored composition of claim 1, wherein said array is less than about 5 μm thick.

11. (original): The colored composition of claim 8, wherein said array has an aspect ratio of at least about 2.

12. (original): The colored composition of claim 8, wherein said array has an aspect ratio of about 5 to 100.

13. (original): The colored composition of claim 8, wherein said array has an aspect ratio of about 10.

14. (original): The colored composition of claim 1, wherein said particles are about 0.01 to about 1 micron in diameter.

15. (original): The colored composition of claim 14, wherein the sizes of said particles differs by up to about 5 to about 15 percent.

16. (original): The colored composition of claim 1, wherein said array includes at least about 5 layers of said particles.

17. (original): The colored composition of claim 1, wherein said array of particles includes about 10 to about 30 layers of said particles.

18. (original): The colored composition of claim 1, wherein said carrier comprises a resinous binder.

19. (original): The colored composition of claim 1, wherein said composition is a paint.

20. (original): The colored composition of claim 1, wherein said composition is a cosmetic.

21. (original): The colored composition of claim 1, wherein said matrix or said particles further comprise a plurality of nanoscale particles.

22. (original): The colored composition of claim 21, wherein said nanoscale particles increase the refractive index of said matrix or particles.

23. (original): The colored composition of claim 22, wherein said nanoscale particles are selected from the group consisting of a metal, a metal oxide, a mixed metal oxide, a metal bromide, and a semi-conductor.

24. (original): The colored composition of claim 21, wherein said nanoscale particles decrease the refractive index of said matrix or particles.

25. (original): The colored composition of claim 24, wherein said nanoscale particles are selected from the group consisting of a metal oxide, a mixed metal oxide, and a metal fluoride.

26. (currently amended): A radiation diffraction material comprising an ordered periodic array of particles held in a matrix, wherein said radiation diffractive material is produced by providing a dispersion of similarly charged particles in a carrier to produce an ordered periodic array of said particles, coating said array of particles with a matrix, and fixing said array of particles within said matrix, wherein a difference in refractive index between said matrix and said particles is at least about 0.01 and said matrix is a cross-linked polymer.

27. (original): The radiation diffraction material of claim 26, wherein the difference in refractive index between said matrix and said particles is at least about 0.1.

28. (cancelled)

29. (currently amended): The radiation diffraction material of claim ~~28~~26, wherein said polymer is selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

30. (original): The radiation diffraction material of claim 26, wherein said matrix is selected from the group consisting of a metal oxide and a semiconductor.

31. (original): The radiation diffraction material of claim 26, wherein said particles comprise a polymeric material selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

32. (original): The radiation diffraction material of claim 26, wherein said particles comprise a material selected from the group consisting of a metal oxide and a semiconductor.

33. (original): The radiation diffraction material of claim 26, wherein said array is less than about 20 μm thick.

34. (original): The radiation diffraction material of claim 26, wherein the sizes of said particles differs by up to about 5 to about 15 percent.

35. (original): The radiation diffraction material of claim 26, wherein said particles are about 0.01 to about 1 micron in diameter.

36. (original): The radiation diffraction material of claim 26, wherein said particles are about 0.06 to about 0.5 micron in diameter.

37. (original): The radiation diffraction material of claim 26, wherein a surface of each said particle contacts another said particle.

38. (original): The radiation diffraction material of claim 37, wherein said particles are arranged in a plurality of layers.

39. (original): The radiation diffraction material of claim 38, wherein said array includes at least about 5 of said layers of particles.

40. (original): The radiation diffraction material of claim 38, wherein said array of particles includes about 10 to about 30 layers of said particles.

41. (original): The radiation diffraction material of claim 26, wherein said particles comprise about 25 to about 80 vol.% of the colorant.

42. (original): The radiation diffraction material of claim 26, wherein said particles comprises about 72 to about 76 vol.% of the colorant.

43. (original): The radiation diffraction material of claim 26, wherein said material reflects visible light.

44. (original): The radiation diffraction material of claim 26, wherein said material reflects electromagnetic radiation outside the visible spectrum.

45. (original): A radiation diffractive composition comprising a carrier and a radiation reflective material comprising an ordered array of particles held in a matrix wherein a difference in refractive index between said matrix and said particles is at least about 0.01.

46. (original): The radiation diffractive composition of claim 45, wherein the difference in refractive index between said matrix and said particles is at least about 0.1.

47 (original): The radiation diffractive composition of claim 45, wherein said matrix is a cross-linked polymer.

48. (original): The radiation diffractive composition of claim 47, wherein said polymer is selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

49. (original): The radiation diffractive composition of claim 45, wherein said matrix is selected from the group consisting of a metal oxide and a semiconductor.

50. (original): The radiation diffractive composition of claim 45, wherein said particles comprise a polymeric material selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

51. (original): The radiation diffractive composition of claim 45, wherein said particles comprise a material selected from the group consisting of a metal oxide and a semiconductor.

52. (original): The radiation diffractive composition of claim 45, wherein said material reflects visible light.

53. (original): The radiation diffractive composition of claim 45, wherein said material reflects electromagnetic radiation outside the visible spectrum.

54. (currently amended): A method of fixing an array of particles in a matrix comprising the steps of:

(a) providing a dispersion of similarly charged particles in a carrier to produce an ordered periodic array of the particles;

~~(b) applying the dispersion onto a substrate;~~

~~(c) evaporating the carrier to produce an ordered periodic array of the particles on the substrate;~~

(~~d~~b) coating the array of particles with a matrix; and

(e~~c~~) fixing the ~~arrays~~array of particles within the matrix.

55. (original): The method of claim 54, wherein the dispersion comprises about 1 to about 70 vol.% of the charged particles.

56. (original): The method of claim 54, wherein the dispersion comprises about 30 to about 65 vol.% of the charged particles.

57. (original): The method of claim 54, wherein said step of providing a dispersion of charged particles further comprises (i) dispersing the charged particles in the carrier to produce a pre-dispersion and (ii) purifying the pre-dispersion to produce the dispersion.

58. (original): The method of claim 57, wherein step (ii) comprises purifying the pre-dispersion via ultra filtration.

59. (original): The method of claim 57, wherein step (ii) comprises purifying the pre-dispersion via ion exchange, dialysis, electrostatic separation, field flow fractionation, or centrifugation.

60. (currently amended): The method of claim ~~54~~75 further comprising removing the fixed array of particles from the substrate.

61. (original): The method of claim 60, wherein the substrate is a flexible member.

62. (original): The method of claim 61, wherein the flexible member comprises a polymer film or metal.

63. (original): The method of claim 60, wherein the substrate comprises an inflexible member.

64. (original): The method of claim 63, wherein the inflexible member comprises glass or metal.

65. (currently amended): The method of claim 54, wherein the fixed array produced in step ~~(e)~~(c) is less than about 20 μm thick.

66. (original): The method of claim 54, wherein the dispersion is applied to the substrate by dipping, spraying, brushing, roll coating, gravure coating, curtain coating, slot-die coating, or ink-jet coating.

67. (original): The method of claim 54, wherein the matrix is coated onto the array of particles by dipping, spraying, brushing, roll coating, gravure coating, curtain coating, slot-die coating, or ink-jet coating.

68. (original): The method of claim 54, wherein the fixed array of particles are removed from the substrate in the form of flakes.

69. (original): The method of claim 54, wherein the carrier is water.

70. (currently amended): The method of claim 54, wherein the matrix is a curable polymer and step ~~(e)~~(c) comprises curing the polymer.

71. (original): The method of claim 70, wherein the polymer is selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

72. (original): The method of claim 54, wherein said matrix is selected from the group consisting of a metal oxide and a semiconductor.

73. (original): The method of claim 54, wherein said particles comprise a polymeric material selected from the group consisting of a polyurethane, an acrylic polymer, an alkyd polymer, a polyester, a siloxane-containing polymer, a polysulfide, an epoxy-containing polymer, and a polymer derived from an epoxy-containing polymer.

74. (original): The method of claim 54, wherein said particles comprise a material selected from the group consisting of a metal oxide and a semiconductor.

75. (new): The method of claim 54 further comprising, prior to step (c), steps of:

applying the dispersion onto a substrate; and

evaporating the carrier to produce an ordered periodic array of the particles on the substrate.